UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

FOURTH ANNUAL INSECT SURVEY OF THE COEUR D'ALENE NATIONAL FOREST -1932-

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FOURTH ANNUAL INSECT SURVEY OF THE COEUR D'ALENE NATIONAL FOREST

Artificial control measures have been conducted in the white pine stands of the Coeur d'Alene National Forest during the past four years in an attempt to control an epidemic of the mountain-pine beetle (Dendroctonus monticolae Hopk.), which has been destroying several thousand trees annually. Although previous reports have included the history of the Coeur d'-Alene control projects, it is thought best to include a brief summary of them in this report.

The infestation of this insect has been known to exist for several years; in fact, an experimental control project was instituted in 1924 on Independence Creek[1]. Control measures were first recommended by the Bureau of Entomology to combat an outbreak of the mountain-pine beetle in Steamboat Creek, with the understanding that a survey would be made of the entire forest in the fall of 1929 to determine the full extent of the infestation. Accordingly, in the spring of 1929, control measures were instituted in this area by the Forest Service, and 1,074 trees were treated which was but 43 per cent of the estimated infestation. Further work was abandoned because of the lack of funds. During the summer and fall of 1929, nearly 100,000 acres of the forest were surveyed, and as suspected, it was found that the infestation was spread throughout the forest with heavy centers in Yellow Dog Creek and in the Big Elk and Potter Creek drainages. After an analysis

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1 Evenden, J. C. 1927. Final Report on the Independence Creek Experimental Control Project, Coeur d'Alene National Forest. (Unpublished report).

of the survey data, it was estimated that there were 26,000 infested trees in the entire forest. Control measures were recommended and $150,000 appropriated for the project, which took place in the spring of 1930. A more intensive survey followed this operation to determine the effects of the control measures. All of the units were found to be reinfested to some extent, but on the entire forest a 57 per cent reduction had occurred. Further control measures were instituted during the fall of 1930 and in the spring of 1931 and 7,116 infested trees were treated. During the summer of 1931 an insect survey was again made to determine the amount of reinfestation which had occurred. Over 127,000 acres were cruised and the data secured showed that 12,505 trees were infested. This figure was a 24 per cent increase over the previous year[2]. The increased infestation was considered due, to a large extent, to the infestation of windfalls which fell during a severe windstorm in April, 1931. The windfalls constituted excellent host material which offered practically no resistance and in which a few insects could make a successful attack and produce large broods. The infestation had become more scattered, increasing the difficulties of control as the infested trees now occurred singly or in small scattered groups that were hard to find. Control measures were recommended and during the spring of 1932, 7,900 infested trees were treated. The following table shows the trend of the infestation during the past four years:

Area Surveyed 100,000 107,000 127,000 127,000

	1929	1930	1931	1932	
Estimate on forest	25,904	9,327	12,505	15,007	
Recommended for treatment	25,904	7,517	7,477	6,592	1,100 C.L.
Treated	22,841	7,116	7,906	*2,087	1,135 C.L.

*This work is to be completed in the spring of 1933.

2 Evenden, J. C. & Terrell, T. T. 1932. Final Report of 1931 Forest Insect Survey of the Coeur d'Alene National Forest with Recommendations for Control. (Unpublished report).

The 1932 insect survey of the Coeur d'Alene National Forest was conducted as in previous years during the months of August and September. Five compassmen and one combination cook and truck driver were employed. A truck was used in preference to a pack string because the many miles of new roads made it possible to reach nearly all the units and to save time on the moves. During this survey, 127,430 acres were cruised by the sample-strip method, and 6185 sample acres or 4.85 per cent of the area was examined. This percentage is somewhat higher than the year before when 4.3 per cent of the same area was covered.

On September 26, 1932, an estimate of the number of insect infested trees on several units of the Coeur d'Alene Forest was given to the Regional Office of the Forest Service in Region 1, in order that control measures could be applied without delay. This estimate was given as a preliminary figure, for very little time had been available in which to analyze the data. Some of the figures given were mere guesses based on conditions known to exist the year before. Later, at the close of the survey, these estimates were changed for they were found to be in error. This is especially true of the Copper Creek unit.

In this report further changes may be noted as more time has been spent analyzing the data. However, they will be found to be minor changes due mostly to the difference in size of some of the units.

The following recommendations for control have been made by the Bureau of Entomology:

Unit	Acres	Estimated infested trees	Treated fall 1932 Acres	Trees	
Yellow Dog River	2140	1249	2140	1001	
Yellow Dog Creek	1000	226	917	268	
Yellow Dog No. side	840	302	270	72	Not completed
Downey Cr.	3120	505	1888	403	
Flat Cr.	1920	576	1184	343	
Bennett Cr.	Included in Flat Creek.				
Brett Miner Rock City	400	1100 (cull logs)	400	1135 (cull logs)	
Cathcart Dam	3200	768			
Honeysuckle	2700	669			
Forks-Cabin	5440	783	Steamboat Drainage		
Clay Cr.	2320	417	do		
Lower Cougar	3600	534			
Upper Cougar	3700	573			

The three units, North Side of Yellow Dog, Downey and Flat Creeks, where control measures were instituted in the fall of 1932, were not treated to the extent recommended. The 1920 acres set up for Flat Creek was only a tentative figure intended to include most of three sections which contained heavy centers of infestation. The North Yellow Dog unit was not finished because of inclement weather. The acreage of Downey Creek was reduced after

the more heavily infested portions had been treated and it was realized that the funds allotted for the project would not permit a thorough cleanup.

The following tables show the data from the surveys of 1930, 1931 and 1932. It will be noted that the acreages of various units have been changed from time to time as additional knowledge of the timber stands was gained. A new unit (Bennett Creek) has been made from part of the Brett-Miner Creek unit, because it is more or less isolated and is worked separately during control projects. Data from the 1931 survey have been separated and applied to these revised units for the purpose of comparison. In some instances the acreages of the units do not compare with the acreages on which control is recommended, because control measures are often recommended only for the heavily infested portions. Under "Acres Surveyed", the units on which control measures have been instituted are marked with an asterisk. The number of trees treated is not given, for these data are not always available by units. All data available will be given as each unit is discussed.

In the foregoing tables the number of infested trees on each unit has been computed by two different methods. The first, which has been used on all insect surveys in the past, is the standardized method of taking sample strips of an infested area and counting all the infested trees per acre on these strips. After a number of these sample strips were run in a unit of known size, the number of infested trees per acre, as found on the strips, was multiplied by the number of acres in the unit. This, as a rule, gave an accurate figure on which to base control measures. However, the accuracy was dependent on the proper placing of these strips so as to secure a sample which would be representative of the whole unit.

The second method is based on the same principle, but has as a governing factor, the density of the stand. During the insect surveys of 1931 and 1932, all green white pine of a size large enough for mountain-pine beetle infestation were counted as they occurred on the sample strips and were recorded by acres. This was done in order to secure information as to densities of stand in different areas. By massing the data from the two years, a green stand per acre figure was secured which is based on about a 9 per cent survey. It was noticed that there was quite a wide variation in the green trees per acre found in 1931 and in 1932, which brought out the fact that regardless of how carefully a strip was plotted, it did not always secure a representative sample of the stand because of the irregularity within the stand. Consequently, if an average of 33 green trees per acre were found during a survey on a unit in which further data showed a stand of 40 green trees per acre, we should know that less than the average stand had been examined and that our strip data was accordingly low. This could be

corrected to some extent, if we found that 1.41 per cent of the green trees in the 33-per-acre strip was infested, and applying the 1.41 per cent to the true or 40-tree-per-acre stand.

In the foregoing tables these corrections have been made and, while as yet the corrected figures are not used as the estimates, they are given for what they are worth and it is hoped that after another survey has been made, the timber stand for each unit will be well enough established to permit the use of this system. By referring to the table, it will be noted that the above example was taken from the Yellow Dog River unit where in 1931, 33 green trees per acre were found on the strip and 1.41 per cent of them was infested. In 1932, 47 green trees per acre were found with a 1.24 per cent infestation. As nearly the same amount of strip was run during the two years, the average stand is 40 trees per acre. While the 1931 strip was low as to trees per acre, the 1932 strip was high. This is corrected by applying the percentage of both years to the 40 trees-per-acre stand. A 12 per cent decrease in the 1932 infestation is shown by this method, while a 25 per cent increase is shown by the original system of counting the infested trees per acre on a sample strip and applying the figure secured to the total acres of the unit. The infested trees in the Yellow Dog River unit were treated following the survey and the number of infested trees actually found, plus 12.6 per cent which was missed, falls midway between the estimate made by applying the infested trees per acre to the total acres of the unit and the estimate made by applying the per cent of stand infested to the 40-tree-per-acre stand. The infested trees per acre figure, when applied to the total acres of the unit, have an estimated 1249 infested trees, while the 1.24 per cent of the stand, when applied to the 40-tree stand and reduced to an infested tree per acre figure, gave an estimate of

1061 infested trees. During the control project 1001 infested trees were spotted while a close check showed that only 87.4 per cent of the trees were found. By applying the 12.6 per cent missed to the 1001, it raises the actual number of infested trees on the unit to 1145. On another unit (North Yellow Dog), the per cent of stand figure seems to be more accurate than the tree per acre figure. While this unit is not as yet completed, the part which was spotted, plus a correction for the trees missed, indicate that there are .304 infested trees per acre, while the per cent of stand applied to the average stand shows an infestation of .310 per acre. The infested trees per acre as found on the sample strips is .360. It will be seen from the tables that the average stand is 34.5 trees per acre, while the sample strips of the 1932 survey were taken in a 40-tree-per-acre stand which, no doubt, account for the inflated .360 trees per acre figure. Of course, this is as yet an experiment carried on with our survey, but it is thought that it has possibilities of use on forests where annual surveys are contemplated as they are on the Coeur d'Alene Forest. It is planned to carry on these annual surveys after the project is closed in order to check the results of control.

The accuracy of the per-cent-of-stand method of forming estimates will depend to some extent on whether the per cent of stand infested is the same for heavy stands as for light stands. Graph No. 1 shows the variation in the per cent of stand infested in different stand densities. As the data shows, there is a variation of .4 of one per cent of infestation. Graph No. 2, which is on the same scale of density, shows the infested trees per acre in relation to density of stand. The data given in these graphs were taken during the seasons of 1931 and 1932 and are based on examinations of over 11,000 sample acres.

NO. 1
PERCENT OF STAND INFESTED
.70
.60
.50
.40
.30
.20
.10
.00
NO. 2
INFESTED TREES PER ACRE
.320
.280
.240
.200
.160
.120
.080
.040
.000
0 1' 2' 3' 4' 5' 6' 7' 8' 9' 10' 11'
15 25 35 45 55 65 75 85 95 10.5 11.5 +
GREEN STAND PER ACRE
KEUFFEL & ESSER CO N.Y.

The fact that a higher per cent of the timber is infested in the thinner stands may be due to unfavorable site, logging operations, or chance selection. In the first instance, it may be said that the unfavorable site for white pine is the cause of the light stand and that trees growing under this unfavorable condition would be more susceptible to insect attack than the trees in a normal stand. Logging operations may have weakened the trees through exposure, which would allow more wind-throw and sun scald, or perhaps caused a building up of the infestation from cull logs and other slash which provide an abundance of unresistant host material. However, a chance flight of insects into an area of light stand would, no doubt, infest a higher percentage of the timber than would be infested had they flown into a heavier stand.

The following is a brief discussion of the different units as they occur on the forest. Comments will be made on each, and probable reasons for increases or decreases in the infestation will be given where any seem to exist. However, while it is usually easy to point out reasons for a decrease in the infestation, it is rather hard to explain why some areas remain the same or show any increase following control measures. With each of the following units a short table is given showing the acres surveyed, the new attacks per acre, the total estimated trees infested and, where available, the number of trees treated. Control measures were usually applied the following spring, but for comparison the trees treated are placed <u>under</u> the year in which the trees were infested. In some instances control measures were not applied to the entire unit but were confined to the more heavily infested portions.

Forks

	1929	1930	1931	1932
Acres surveyed	-	1240	2040	1100
New attacks per acre	-	.110	.206	.154
Trees infested	-	136	420	169
Acres recommended for treatment	-	1240	1000	None
Acres treated	1240	No data	1100	-
Trees recommended for treatment	-	136	233	-
Trees treated (following spring)	259	No data	75	-

The Forks unit is in the Little River District at the head of the Little Coeur d'Alene River. Control measures were instituted in this unit in the spring of 1930 when 259 trees were treated. Control was again conducted in the spring of 1932. The timber on this area is to a large extent very large and over mature.

Tom Lavin

	1929	1930	1931	1932
Acres surveyed	-	3150	3320	3000
New attacks per acre	-	.090	.090	.101
Trees infested	-	284	298	303
Acres recommended for treatment	-	3150	3320	None
Acres treated	3150	No data	2762	-
Trees recommended for treatment	-	284	298	-
Trees treated (following spring)	950	No data	317	-

Control has been applied to this unit for the last three years with no decrease in the infestation. There is no explanation for this condition unless it is the noneffectiveness of the control, or the flight of insects into the unit. Snow conditions usually cause a late start in the spring on this and the Forks unit which may be a factor to be considered. However, examinations made on the infested trees during the 1932 survey do not indicate a high per cent of early attacks as would be the case if the brood were too far advanced during control operations.

Iron Creek

	1929	1930	1931	1932
Acres surveyed	-	3840	4120	4120
New attacks per acre	-	.050	.019	.102
Trees infested	-	192	78	420
Acres recommended for treatment	-	None	None	None
Acres treated	3840	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated (following spring)	635	-	-	-

The survey data show a 427 per cent increase during the past year on this unit. It is believed that this figure is inflated due to the sample strips running through a group of infested windfalls. This will, no doubt, be compensated in some other part of the forest, but gives a figure entirely too high for the unit. Control work was instituted on this unit in 1930 and up to the present time a good decrease was shown.

The three units listed above will serve to illustrate one of the intangible problems of insect control. These units are all closely joined and may be considered as one area. However, as the tables show, control measures have been applied to the Tom Lavin unit every year since 1930, when 950 infested trees of the previous year's infestation were treated. The Forks unit was treated in the spring of 1930 and since that date control measures have been confined to treating crews working out of the Tom Lavin camp and only the more heavily infested parts were treated. Control measures were only instituted in the Iron Creek unit in the spring of 1930. Despite the continued application of control measures in Tom Lavin Creek, the infestation in that unit has increased, while with only partial control in the Forks unit since 1930 the infestation is now about the same as during the fall following the control of 1930. One high point was reached in 1931 when an estimated 420 infested trees were found of which 75 were treated. Following this control a 25 per cent reduction followed. At the same time this

reduction occurred, a proportionate increase took place in the Iron Creek unit, which had shown a 62 per cent decrease during 1931. This seems to indicate that there is an interchange of insects between units with the beetles moving from the Iron Creek unit into the Tom Lavin unit in 1931, and the beetles from the Forks unit moving into the Iron Creek unit in 1932. However, very little is known of the flight habits of these insects and any statements relative to this interchange are based on probabilities only.

Cathcart

	1929	1930	1931	1932
Acres surveyed	-	3440	3200	3200
New attacks per acre	-	.063	.045	.237
Trees infested	-	215	144	758 plus 872 cull logs
Acres recommended for treatment	-	None	None	3200
Acres treated	3440	-	-	-
Trees recommended for treatment	-	-	-	758
Trees treated (following spring)	1103	-	-	-

The timber on this unit seems to be very susceptible to insect infestation. A great many infested stumps and cull logs were found in Beaver Creek and a number of infested windfalls and trees in lower Burnt Cabin. The logging operations which have taken place in the Burnt Cabin drainage during the past several years probably served as an attraction to the insects which attacked the slash and some of the remaining seed trees. For comparative purposes, two infested cull logs are considered as equal to one tree. Control measures are recommended for the infested trees, but the cull logs are not included for they are early attacks and now contain an advanced stage of brood.

Cascade

	1929	1930	1931	1932
Acres surveyed	-	4560	4640	4640
New attacks per acre	-	.078	.083	.092
Trees infested	-	355	385	427
Acres recommended for treatment	-	4560	None	None
Acres treated	4560	No data	-	-
Trees recommended for treatment	-	355	-	-
Trees treated (following spring)	1416	No data	-	-

Very little increase is noted in this unit and the infestation is hardly heavy enough to warrant control measures at this time.

Picnic

	1929	1930	1931	1932
Acres surveyed	-	1360	1680	1680
New attacks per acre	-	.120	.064	.091
Trees infested	-	163	107	153
Acres recommended for treatment	-	None	None	None
Acres treated	None	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated (following spring)	-	-	-	-

This unit is another of those units in which logging has taken place recently. As very little is known about the trend of infestations following logging operations, it is thought best to keep this unit under observation for another year. It is probable that no great increase will take place and, after the cull material is exhausted, the infestation may return to normal.

Honeysuckle

	1929	1930	1931	1932
Acres surveyed	-	4160	4320	5320
New attacks per acre	-	.046	.057	.160
Trees infested	-	191	246	851
Acres recommended for treatment	-	None	None	2700
Acres treated	2580	-	-	-
Trees recommended for treatment	-	-	-	669
Trees treated (following spring)	550	-	-	-

This unit has shown an increase each year since the spring control

of 1930, and has reached a point where control measures could be instituted in the more heavily infested portion to advantage.

Delaney-Lindberg

	1929	1930	1931	1932
Acres surveyed	-	3200	3200	3200
New attacks per acre	-	.030	.012	.070
Trees infested	-	96	38	224
Acres recommended for treatment	-	None	None	None
Acres treated	None	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated (following spring)	None	-	-	-

Most of the timber on this unit has been logged and the remaining stand is infested to a point somewhat above normal but not to any serious extent.

Lieberg

	1929	1930	1931	1932
Acres surveyed	-	3820	3920	4440
New attacks per acre	-	.054	.207	.101
Trees infested	-	206	811	448
Acres recommended for treatment	-	None	3920	None
Acres treated	3820	-	5000	-
Trees recommended for treatment	-	-	811	-
Trees treated (following spring)	728	-	654	-

The serious increase which resulted in 1931 due to the large number of infested windfalls was satisfactorily checked through the 1931 spring control project. The 51 per cent reduction brings the infestation down to .101 per acre, which, although still above normal, puts this unit in a position where it seems safe to abandon control measures for the present.

Laverne Creek

	1929	1930	1931	1932
Acres surveyed	-	2300	2200	2560
New attacks per acre	-	.052	.085	.123
Trees infested	-	120	187	315
Acres recommended for treatment	-	None	None	None
Acres treated	2300	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated (following spring)	136	-	-	-

The increase in the infestation on this unit, while not as high as last year, brings the infestation to a point where it would ordinarily be regarded as warranting control; however, since a few units which had nearly as high an infestation last spring, decreased during the year without control (Copper Creek, Stewart and Potter Creeks) the tendency is to leave these areas as they are.

Copper Creek (Breakwater)

	1929	1930	1931	1932
Acres surveyed	-	3880	4000	4000
New attacks per acre	-	.054	.156	.105
Trees infested	-	209	624	420
Acres recommended for treatment	-	None	None	None
Acres treated	None	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated	None	-	-	-

This unit showed a 189 per cent increase in 1931 but dropped back 35 per cent in 1932, although no control measures were instituted. It may be that the infestation is returning toward normal.

Summary of the Little River District

	1929	1930	1931	1932
Acres surveyed	20070*	34950	36640	37260
New attacks per acre	.0896	.0617	.0911	.1321
Trees infested	1800	2157	3338	4924
Acres recommended for treatment	20070	8950	8240	5900
Acres treated	25230	4947	8862	-
Trees recommended for treatment	1800	707	1342	1427
Trees treated	5777	616	1046	-

*The 1929 survey, which was made in this district by counting red-tops or 1928 attacks and estimating the probable increase, did not include any of the Little River below the mouth of Cascade Creek. This excluded the following units: Honeysuckle, Delaney-Lindberg, Lieberg, Laverne and Copper Creek. Control measures were instituted on the first four of these units which accounts for the wide difference between the estimated figure and the number treated.

As will be seen by the foregoing summary, the infestation in the Little River district has increased over 100 per cent since 1930, and is back to the 1929 level when over 5000 trees were treated. However, the character of the infestation has changed materially. The 1929 infestation was grouped with more infestation along the creek bottom than on the side hills and ridge, while the 1932 infestation is more evenly spread over the unit. This accounts for the decreasing number of trees recommended for treatment each year because it is not thought practical to cover such large areas during control projects.

Taylor's Camp

	1929	1930	1931	1932
Acres surveyed	-	2240	2720	2800
New attacks per acre	-	.045	.126	.054
Trees infested	-	100	342	151
Acres recommended for treatment	-	None	2720	None
Acres treated (following spring)	2240	-	2205	-
Trees recommended for treatment	-	-	342	-
Trees treated (following spring)	402	-	534	-

A 57 per cent reduction in the infestation was secured following the control work last spring. The infestation in this unit has now reached a level where it should be safe to abandon any further control.

Can Creek

	1929	1930	1931	1932
Acres surveyed	-	1760	1760	1760
New attacks per acre	-	.304	.159	.087
Trees infested	-	535	279	153
Acres recommended for treatment	-	1760	1760	None
Acres treated (following spring)	1760	1600	1807	-
Trees recommended for treatment	-	535	279	-
Trees treated (following spring)	594	552	303	-

This unit also shows a decrease in the infestation following the control which has been instituted during the past four years. Except for a few infested trees in the creek bottom near the old camp site, the area is quite clean. It wou d be advisable to go into this unit with a crew of men and clean up the trees in the creek bottom. No camp would have to be established as the men could come from one of the other camps.

Forks-Cabin

	1928	1929	1930	1931	1932
Acres surveyed	9000	-	5120	5440	5440
New attacks per acre	.278	-	.069	.041	.131
Trees infested	2500	-	353	223	713*
Acres recommended for treatment	9000	-	5120	None	5440
Acres treated (following spring)	5620	5120	No data	-	-
Trees recommended for treatment	2500	-	353	-	713*
Trees treated (following spring)	1074	1150	No data	-	-

*Reduction of 70 trees from previous estimate.

This unit includes some of the best white pine stands on the forest, perhaps the best in the Northwest. In 1928 a survey was made in this area by the Bureau of Entomology on some 9000 acres. Red-tops or 1927 attacked trees as well as 1928 attacked trees were counted. An analysis of the survey shows that 877 trees were attacked in 1927, and 2500 in 1928. In the spring of 1929, 1074 trees were treated on 5620 acres of this area. Further control measures were instituted on this unit in the spring of 1930 and in the spring of 1931. It is not known how many trees were treated during

the spring of 1931, but there was an estimated 353 for the 1931 project. A survey during the following summer showed a 40 per cent reduction in the infestation and control was abandoned. After being reduced to .041 trees per acre in 1931, the infested area for some unaccountable reason increased 220 per cent or to 713 trees in 1932. Although the infestation is still below those of 1929 and 1930, the per cent of increase is high and, considering the heavy stands in danger, it is thought best to again institute control in this unit.

West Fork

	1929	1930	1931	1932
Acres surveyed	-	2880	3960	3960
New attacks per acre	-	.045	.042	.103
Trees infested	-	130	166	408
Acres recommended for treatment	-	None	None	None
Acres treated (following spring)	2880	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated (following spring)	653	-	-	-

The West Fork unit also showed an increase during the past year which is probably due to windfalls. It will be noted that 76 per cent of all the attacks found were windfalls. Although the infestation on this unit is rather heavy, it is thought safe to let it go for another year.

Clay Creek

	1929	1930	1931	1932
Acres surveyed	-	2440	2320	2320
New attacks per acre	-	.061	.054	.167
Trees infested	-	149	122	387*
Acres recommended for treatment	-	2440	None	2320
Acres treated (following spring)	2440	No data	-	-
Trees recommended for treatment	-	149	-	387*
Trees treated (following spring)	513	No data	-	-

*Reduction of 30 trees from previous estimate.

Clay Creek, which lies at the head of the East Fork, is heavily timbered and the infestation is increasing in the same proportions as in

the Forks-Cabin unit which it adjoins.

Lower Cougar

	1929	1930	1931	1932
Acres surveyed	-	2560	3180	3600
New attacks per acre	-	.059	.121	.150
Trees infested	-	150	385	540
Acres recommended for treatment	-	2560	2540	3600
Acres treated (following spring)	2560	No data	2838	-
Trees recommended for treatment	-	150	367	534
Trees treated (following spring)	292	No data	679	-

Upper Cougar

	1929	1930	1931	1932
Acres surveyed	-	4480	4040	3700
New attacks per acre	-	.038	.053	.141
Trees infested	-	170	214	522*
Acres recommended for treatment	-	4480	None	3700
Acres treated (following spring)	None	No data	-	-
Trees recommended for treatment	-	170	-	522*
Trees treated (following spring)	None	No data	-	-

*50 trees lower than previous estimate.

Although control has been instituted in these units in 1930, 1931 and 1932, there is a continued increase especially in Upper Cougar. Eighty-three per cent of the infestation in the Upper Cougar unit is in windfalls. The windfalls throughout the forest account for a large per cent of the increases in the infestations. They constitute excellent host material and only a few insects are required to make an attack successful. There was a severe blow-down in April, 1931, which greatly increased the available material and probably offset some of the advantage ordinarily expected from control measures. Some of these windfalls remain green and are still fit for hosts the following year. The heavy snowfall during the winter of 1931-1932 also caused a large number of trees to fall. These down trees, while not as heavily grouped as were the windfalls of the previous year, are scattered

over the entire forest and serve as host for the insects not destroyed through control. It will be seen from the table that these windfalls constitute 50 per cent of the infested trees.

Bumblebee

	1929	1930	1931	1932
Acres surveyed	-	1900	3040	3040
New attacks per acre	-	.063	.166	.030
Trees infested	-	119	504	91
Acres recommended for treatment	-	1900	3040	None
Acres treated (following spring)	None	No data	3052	-
Trees recommended for treatment	-	119	504	-
Trees treated (following spring)	None	No data	523	-

A new method of control was tried on this unit during the 1932 spring project. The 82 per cent reduction in the infestation is testimony to the success of the method. Spotting and treating were combined and pack horses used to carry the equipment. One advantage this method has over the usual system is in the examination of trees as when a doubtful tree is found it can be felled and examined more closely. The treating and spotting was in charge of one man who was able to give very close supervision to the work which is a big factor in the success of any control project. More men were used per chain of strip and the crew as a whole progressed much slower than a spotting crew. The Bumblebee unit was a good one on which to test this system as it contained nearly all types of coverage from steep brushy hills to areas of reproduction. The men who worked on this unit expressed satisfaction as to the workability of the method and stated that a horse could be used in nearly all types of terrain and ground cover with the exception of excessive windfall areas. Further work should be done on this method of spotting and treating on the spring project as it has good possibilities and while as yet it is not cheaper, it eliminates some of the weaknesses of the old system.

Summary of the Grizzly Mt. District

	1928	1929	1930	1931	1932
Acres surveyed	9000	31913	23380	27460(1)	27620(1)
New attacks per acre	.278	.158	.073	.083	.109
Trees infested	2500	5059	1706	2288	3008
Acres recommended for treatment	9000	31913	18260	10610(2)	15060
Acres treated (following fall or spring)	5620	17000	23380	10442	-
Trees recommended for treatment	2500	5059	1559	1742	2156*
Trees treated (following fall or spring)	1074	3604	1940	2119	-

*151 trees less than previous estimate

(1) This is 1000 more than given in the units because the Black Canyon area was not listed.

(2) 640 acres in Eighty Day Creek were recommended for treatment with an estimated 250 trees. 540 acres were treated and only 80 trees were found.

Sisson's

	1929	1930	1931	1932
Acres surveyed	-	4000	4700	4700
New attacks per acre	-	.275	.182	.122
Trees infested	-	1100	855	574
Acres recommended for control	-	4000	4700	None
Acres treated	3720	No data	4261	-
Trees recommended for treatment	-	1100	855	-
Trees treated	2135	1200*	1097	-

*approximately

Although the infestation on this unit is .122 per acre, there has been a 34 and a 33 per cent reduction in the past two years. Although the present infestation per acre is above the point where control measures are usually recommended, the figure, in this case, does not tell the story, as the attacks are very light - very seldom attacking more than one side of the tree. The timber on this unit seems to be weakened by some other cause and a great many trees are fading without any evidence of insect attack.

Kiehler Creek

	1931	1932
Acres surveyed	900	900
New attacks per acre	.300 cull logs	.125
Trees infested	-	112
Acres recommended for treatment	-	None
Acres treated	-	-
Trees recommended for treatment	-	-
Trees treated	270 cull logs	-

This is a small new unit which was added to the survey in 1931 when a large number of infested cull logs were found in Kiehler Creek. The logs were treated in the last spring project and a 58 per cent reduction in the infestation was secured.

Yellow Dog (North Side)

	1929	1930	1931	1932
Acres surveyed	Included in Yellow Dog River		840	840
New attacks per acre			.229	.360
Trees infested			192	303
Acres recommended for treatment			840	840
Acres treated			No data	Unfinished
Trees recommended for treatment			174	303
Trees treated			No data	Unfinished

This unit was partially covered in the 1932 fall project but was abandoned when inclement weather made it impossible to continue. It is planned to finish the work on this unit during the 1933 spring project.

Yellow Dog River

	1929	1930	1931	1932
Acres surveyed	-	2280	1880	2140
New attacks per acre	-	.161	.467	.584
Trees infested	-	367	878	1249
Acres recommended for treatment	-	2280	1880	2140
Acres treated	2280	2000*	No data	2140
Trees recommended for treatment	-	366	878	1249
Trees treated	2352	No data	No data	1001

*approxi ately

The timber on this unit seems to be the most susceptible of all the timber on the forest to insect attack, and there has been a steady increase since 1930. This was one of the most heavily infested portions of the forest when control measures were first instituted and it was still more heavily infested than any other unit examined during the 1932 survey. The susceptibility of the timber is, no doubt, a big factor in this continued state of infestation. One source of reinfestation is through infested trees missed during control projects. Checks made on the 1932 spring and fall projects prove that it is practically impossible to find all the infested trees on a large area. Through this inspection it was found that from 57 to 95 per cent of the trees were spotted. The average from the spring project on three units was 75.6 per cent, while the average for the fall job was 85 per cent. These checks were made on crews which had nearly all had previous experience and were the best trained spotters ever used on any of the Coeur d'Alene projects. One can assume that if these well trained crews missed from 15 to 25 per cent of the infested trees, more trees must have been missed during the past projects when less supervision and less time was available in which to train the men. This would have a more noticeable effect on the infestation in the Yellow Dog units than elsewhere as the infestation was so much heavier. If 25 per cent of the infestation is missed on such heavily infested units, it leaves more infested trees than are on other units when control measures are recommended and, consequently, the subsequent increase is much greater. For example, the 1931 Yellow Dog infestation was .467 infested trees per acre, and if 25 per cent or .117 infested trees per acre are left, the unit is still over the point on which control measures are usually recommended. June attacks, or the attacks of overwintering adult beetles, are another factor which is quite important

in these heavily infested units. These early attacks have increased to about 60 per cent of the total. However, there is an overlapping of attacks caused by the main or July emergence attacking the same trees which were attacked in June. During the latter part of June, examinations made on 304 acres in the Yellow Dog River unit showed that there were .388 newly infested trees per acre. The fall survey showed that there were .584 infested trees per acre. On the Downey Creek unit June examinations of 156 acres showed .154 infested trees per acre, while the fall survey of 240 sample acres showed the same amount or .154 infested trees per acre. It is quite evident that the main or July brood emerged and to a large extent attacked the same trees. It is thought that this condition is due to the spring peeling method of control which destroys the normal or main brood and not the overwintering adult beetles. An attempt to correct this condition was made last year by the fall control. The trees were burned which assures 100 per cent mortality in the trees treated.

Yellow Dog Creek

	1929	1930	1931	1932
Acres surveyed	-	2880	4120	4120
New attacks per acre	-	.138	.069	.133
Trees infested	-	397	284	448
Acres recommended for treatment	-	2880	1000	1000
Acres treated (following fall or spring)	2880	No data	720	917
Trees recommended for treatment	-	397	180	226
Trees treated (following fall or spring)	1111	No data	No data	268

Fall control was instituted on this unit on 917 acres and a very thorough job was done. About one-half section of rather heavily infested timber had to be left in the head of the drainage due to weather conditions and lack of funds. It is recommended that if at all possible this be cleaned up when the remainder of the North Side Yellow Dog unit is finished.

Downey Creek

	1929	1930	1931	1932
Acres surveyed	-	2560	4160	4160
New attacks per acre	-	.244	.167	.154
Trees infested	-	624	694	640
Acres recommended for treatment	-	2560	3120	3120
Acres treated (following fall or spring)	2560	No data	2401	1888
Trees recommended for treatment	-	624	558	505
Trees treated (following fall or spring)	1208	No data	743	403

The Downey Creek unit has always been difficult to work due to the rough topography and underbrush. The check spotting showed more trees missed on this unit than on the others, and yet there has been a decrease in the infestation during the last three years. An explanation of this may be that the insects are attracted from this unit into the adjacent Yellow Dog River unit which, during the past three years, has been on the increase. During the fall project all of the more heavily infested areas in this unit were spotted and 403 trees were treated.

Flat Creek

	1929	1930	1931	1932
Acres surveyed	-	3200	2840	4120
New attacks per acre	-	.126	.080	.221
Trees infested	-	403	227	910
Acres recommended for treatment	-	3200	800	1920
Acres treated (following fall or spring)	2400	No data	982	1184
Trees recommended for treatment	-	403	187	576
Trees treated (following fall or spring)	711	No data	189	343

The Flat Creek infestation, except for the part controlled during the 1932 fall project, is relatively light. The survey data for the unit is believed to have been inflated somewhat by a large group of infested trees found on one of the survey strips.

Bennett Creek

	1929	1930	1931	1932
Acres surveyed	-	-	580	580
New attacks per acre	-	-	.028	.161
Trees infested	-	-	16	93
Acres recommended for treatment	-	-	Included in the Brett-Miner Unit.	Incl. in the Flat Cr. unit.
Acres treated (following fall or spring)				
Trees recommended for treatment				
Trees treated (following fall or spring)				

Part of the Flat Creek and Brett-Miner Creek units was made into a separate unit for the purpose of better comparison. Data from the 1931 survey were replotted on the revised units. The large Rock City blowdown occurred on this unit in 1931 causing a heavy infestation in the windfalls during the summer of 1931 and again in 1932. Quite a number of these windfalls were still green last fall. During the fall control project, 343 infested trees were treated on this and part of the Flat Creek unit.

Rock City

	1929	1930	1931	1932
Acres surveyed	-	2260	1600	1600
New attacks per acre	-	.104	.016	.031
Trees infested	-	235	22	49 220 C.L.
Acres recommended for treatment	-	2260	None	-
Acres treated	2260	No data	-	-
Trees recommended for treatment	-	235	-	220 C.L.
Trees treated	1030	No data	-	255

Brett-Miner

	1929	1930	1931	1932
Acres surveyed	-	1980	1550	1550
New attacks per acre	-	.026	.133	.109
Trees infested	-	51	206	169 880 C.L.
Acres recommended for treatment	-	None	840	400
Acres treated	Included in	-	1050	400
Trees recommended for treatment	Rock City	-	132	880 C.L.
Trees treated	-	-	309	880 C.L.

The Rock City and Brett-Miner units were mostly destroyed by fire in the late summer of 1931. Except for a few trees in Miner Creek, all the trees burned were so badly scorched that they were unfit for host material. One thousand one hundred thirty-five cull logs left after the salvage logging operation were treated on these units during the 1932 fall project.

Hawksite

	1929	1930	1931	1932
Acres surveyed	-	4040	8000	8780
New attacks per acre	-	.098	.139	.035
Trees infested	-	396	1112	307
Acres recommended for treatment	-	4040	8000	None
Acres treated	No control	No data	6715	-
Trees recommended for treatment	-	396	1112	-
Trees treated	-	No data	685	-

A very good control job was conducted on 6715 acres of this unit during the 1932 spring project and a 75 per cent reduction in the infestation was secured. This unit should be an example of what can be accomplished through thorough work.

Cabin Creek

	1929	1930	1931	1932
Acres surveyed	-	6500	7000	7000
New attacks per acre	-	.088	.067	.021
Trees infested	-	572	462	147
Acres recommended for treatment	-	6500	None	None
Acres treated	No control	No data	-	-
Trees recommended for treatment	-	572	-	-
Trees treated	-	No data	-	-

The infestation on this unit decreased 69 per cent although no control was instituted during 1932.

Falls Creek

	1929	1930	1931	1932
Acres surveyed	-	None	6000	2600
New attacks per acre	-	-	.035	.040
Trees infested	-	-	210	104
Acres recommended for treatment	-	-	None	None
Acres treated	-	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated	-	-	-	-

There was a slight increase on this unit during the past year. However, the infestation is very light.

Eagle Creek (West Fork)

	1929	1930	1931	1932
Acres surveyed	None	1640	1640	1280
New attacks per acre	-	.091	.121	.061
Trees infested	-	150	198	78
Acres recommended for treatment	-	None	None	None
Acres treated	-	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated	-	-	-	-

Eagle Creek (East Fork)

	1929	1930	1931	1932
Acres surveyed	None	3520	3000	3540
New attacks per acre	-	.057	.200	.066
Trees infested	-	200	600	234
Acres recommended for treatment	-	None	3000	None
Acres treated	-	-	3261	-
Trees recommended for treatmeat	-	-	600	-
Trees treated	-	-	713	-

There was a very good reduction in both the east and west forks of Eagle Creek, following the control measures which were instituted in the east fork last spring.

Summary of the Shoshone District

	1929	1930	1931	1932
Acres surveyed	34728(1)	36220(1)	48810	47910
New attacks per acre	.281	.126	.125	.125
Trees infested	9772	4467	6091	5967
Acres recommended for treatment	34728	29680	24180	9420
Acres treated	17460(1)	19570(1)	21362	6799(2)
Trees recommended for treatment	9772	4248	4393	2858 1100 C.L.
Trees treated	8954(1)	4085(1)	4741	2087 1135 C.L.(2)

(1) Cinnamon Creek, a unit of 1360 acres, is included in these figures. The unit was completely destroyed by fire during the summer of 1931.

(2) About 800 acres of this district is to be finished during the spring of 1933.

Big Elk

	1929	1930	1931	1932
Acres surveyed	-	5200	4960	4960
New attacks per acre	-	.038	.000	.081
Trees infested	-	197	-	402
Acres recommended for treatment	-	None	None	None
Acres treated	4960	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated	1163	-	-	-

The 100 per cent increase which was recorded for this area is due to the fact that no infested trees were found during the survey of 1931. The present infestation is not serious but should be watched.

Potter Creek

	1929	1930	1931	1932
Acres surveyed	-	3760	3800	3800
New attacks per acre	-	.096	.091	.082
Trees infested	-	360	351	312
Acres recommended for treatment	-	3760	3800	None
Acres treated	3600	No data	None	-
Trees recommended for treatment	-	360	351	-
Trees treated	2306	No data	None	-

Stewart Creek

	1929	1930	1931	1932
Acres surveyed	-	2000	2200	2200
New attacks per acre	-	.181	.125	.111
Trees infested	-	362	275	244
Acres recommended for treatment	-	2000	2200	None
Acres treated	2000	No data	None	-
Trees recommended for treatment	-	362	275	-
Trees treated	506	No data	None	-

Control measures were recommended for Potter and Stewart Creeks last year, but because of a shortage of funds and heavy snow conditions, they were not applied. However, a 10 and an 11 per cent reduction occurred which would seem to indicate that the infestation is on the decline. No further recommendations for control measures are offered until more is learned of these units.

Upper Flat Creek

	1929	1930	1931	1932
Acres surveyed	-	3680	3680	3680
New attacks per acre	-	.041	.044	.041
Trees infested	-	150	162	150
Acres recommended for treatment	-	None	None	None
Acres treated	2960	-	-	-
Trees recommended for treatment	-	-	-	-
Trees treated	616	-	-	-

As in the Big Elk drainage, there seems to have been a thorough cleanup of the infestation in this drainage during the 1930 spring control project. Very little reinfestation has taken place in this unit.

Summary of Forks District

	1929	1930	1931	1932
Acres surveyed	12829	14640	14640	14640
New attacks per acre	.723	.073	.054	.076
Trees infested	9273	1069	788	1108
Acres recommended for treatment	12829	5760	6000	None
Acres treated	14640*	3518	None	-
Trees recommended for treatment	9273	722	626	-
Trees treated	4872*	475	None	-

* Part of the Brett-Miner unit was worked from this district during the spring of 1930. This area (about 2000 acres) has since burned over and is no longer surveyed.

It will be noticed that some of the totals in these summaries do not always check with the figures given elsewhere in this report. These differences occur because of units or parts of units being abandoned due to fire, lack of infestation, or to the splitting up of units and working them from separate districts.

SUMMARY

It will be seen that throughout the forest there are wide fluctuations in the infestations on the various units. Control measures have an influence on these fluctuations as the following table will show. In it are listed the units where control measures were conducted in the spring of 1932, the units on which no control measures were applied, and the number of units which show increases or decreases and the per cent of increase or decrease. It must be remembered that the units on which control measures were instituted were more heavily infested than the others and had they been left untreated would have increased in greater proportion.

Treated Units				Untreated Units			
Unit	% inc.	Unit	% dec.	Unit	% inc.	Unit	% dec.
Tom Lavin	12	Forks	25	Iron Cr.	427	Copper Cr.	35
Lower Cougar	24	Leiberg	51	Cathcart	427	Black Canyon	19
Yellow Dog N.S.	57	Taylor's Camp	57	Cascade	11	Kiehler Cr.	58
Yellow Dog River	25	Can Cr.	45	Picnic	42	Cabin Cr.	69
Yellow Dog Cr.	93	Bumblebee	82	Honeysuckle	181	W. Eagle Cr.	49
Flat Cr.	176	Sissons	33	Delaney-Lindberg	483	Potter Cr.	10
Bennett Cr.	475	Downey Cr.	7	Laverne	45	Stewart Cr.	11
		Brett-Miner	18	Forks-Cabin	220	Upper Flat Cr.	7
		Hawksite	75	West Fork	145		
		E. Eagle Cr.	67	Clay Cr.	210		
				Upper Cougar	166		
				Rock City	90		
				Falls Cr.	14		
				Big Elk	100		
Total - 7		10		14		8	

In the units listed above, it will be seen that 7 of the treated units showed an increase, while 10 showed a decrease. In the untreated units 14 increased while 8 decreased. Moreover, the untreated areas increased far more than the others and they no doubt had an influence on the treated units. In some instances where areas were treated and showed a decrease, another area adjacent would also show a decrease. The Big Creek area is one example of this. Big Creek contains three units, Hawksite, Cabin Creek and Falls Creek. Control measures were instituted in Hawksite during the spring of

1932, while the other two units were not controlled. The Hawksite unit decreased 75 per cent and the Cabin Creek unit decreased 69 per cent. Falls Creek, which is farther away, increased 14 per cent. The control measures instituted farther west in the Sissons, Yellow Dog and Downey areas might also have contributed to the condition in Big Creek, for had no control been instituted in the Yellow Dog district perhaps an increase would have occurred throughout Big Creek. There is no proof to offer for this theory, but it is felt safe to say that, although some units show an increase following control, the influence of control is felt in adjoining areas and tends to lower the infestation as a whole.

During the 1931 insect survey a new method of running sample strips was tried. Two men ran the strip together, one pacing, running the compass, and counting trees on a strip one chain wide, while the other man counted the infested trees on an adjoining strip. From the results of this test it was planned to adopt it and run about half of the strips of the 1932 survey in that manner. Accordingly, 53 single strips and 65 double strips were run during the 1932 survey. A summary of the two show that there is very little difference between them. The double strips averaged 4.35 miles while the single strips averaged 4.19 miles. The infested trees per acre for the double strips were .129 in comparison to .126 for the single strips. It will be noticed that more miles of strip are given here than the sample acres in the table indicate were run. This is due to the discarding of strip which was run outside the boundaries of a unit in barren or fir type. Some two hundred acres of strip were run more for the purpose of determining the extent of a stand than to secure data on the infestation. It will be noticed that a higher tree-per-acre figure is given than that found in the tables for the forest. This is due to the infested cull logs and stumps found on the strips which were not reduced to a tree basis for this purpose.

COST ANALYSIS OF 1931 AND 1932 SURVEYS

	1931	1932	Cost per mile of strip 1931	1932
Transportation	$ 439.70	$ 81.50	$0.61	$0.10
Subsistence	183.79	118.65	0.26	0.15
Wages (4 men)	1050.08 (5 men)	1213.01	1.45	1.57
Total charge against project	1673.57	1413.16	2.32	1.82
Contributed time (Terrell's salary)	357.50	216.80	.49	.28
Total field cost	$2031.07	$1629.96	$2.81	$2.10

	1931	1932
Total man-days	315	359
Cost per man-day	$6.44	$4.81
Cost per acre surveyed (127550)	0.0159(127,430)	0.0128
Effective paid man-days	139	159
Noneffective paid man-days	113	140
Contributed effective man-days	45	26
Contributed noneffective man-days	18	14
Total effective man-days	184	185
Total noneffective man-days	131	154
Miles of sample strip	722¼	773
Miles of sample strip per each man-day	3.925	4.18
Miles of sample strip per total man-days	2.29	2.28

An allotment of $2000 was set aside from the Forest Service insect control appropriation for the 1932 survey, and all the expenses except Mr. Terrell's salary and $44.00 in car mileage, which were paid by the Bureau of Entomology, were charged against this allotment. The foregoing table gives a summary of the costs of the 1931 and 1932 surveys. The subsistence of the 1932 survey was estimated at 35¢ per man-day. In the noneffective man-days are included 57 days for a cook. The total cost per mile of sample strip is 71¢ lower than in the previous year, which was due mainly to the use of a truck instead of a pack string. More noneffective man-days occurred

than during the previous year because our schedule was broken when data relative to the infestation on the Yellow Dog unit were asked for early in the season. It was necessary to make extra moves so this information could be available for the fall control project.

In closing this report we wish to extend our appreciation of the cooperation rendered by the personnel of the Coeur d'Alene Forest. Every effort was made by these officers, and their assistance contributed much to the efficiency of the project.

Any criticisms or comments relative to data or statements made in this report will be appreciated, and any questions which may be asked will be answered to the best of our ability.

Respectfully submitted,

T. T. Terrell
Assistant Scientific Aid

GRIZZLY MOUNTAIN DISTRICT

Unit	Acres Surveyed 1930	Acres Surveyed 1931	Acres Surveyed 1932	Per cent of unit covered 1931	Per cent of unit covered 1932	New attacks per acre 1930	New attacks per acre 1931	New attacks per acre 1932	Per cent of change in status 1931	Per cent of change in status 1932	New attacks on unit 1930	New attacks on unit 1931	New attacks on unit 1932	Per cent of new attacks were windfalls 1931	Per cent of new attacks were windfalls 1932	Stand white pine trees per acre 1931	Stand white pine trees per acre 1932	Average over two years 1931-1932	Per cent of stand infested 1931	Per cent of stand infested 1932	New attacks per acre taken from % of stand inf. & applied to average stand. 1931	New attacks per acre taken from % of stand inf. & applied to average stand. 1932	Per cent of increase or decrease	Acres of sample strip 1931	Acres of sample strip 1932
Taylor's Camp	2,240*	2,720*	2,800*	2.9	3.3	.045	.126	.054	+180	-57	100	342	151	10	80	17	15	16	.74	.36	.118	.057	-52	78	92
Forks-Cabin	5,120*	5,440*	5,440	7.2	6.2	.069	.041	.131	-41	+220	353	223	713	29	34	25	20	23	.16	.65	.037	.149	+ 303	392	335
Can Creek	1,760*	1,760*	1,760*	5.2	7.2	.304	.159	.087	-48	-45	535	279	153	4	0	24	19	21	.66	.46	.139	.096	-31	91	126
West Fork	2,880*	3,960*	3,960	8.0	8.1	.045	.042	.103	-7	+145	130	166	408	15	76	15	15	15	.28	.69	.042	.103	+ 145	315	320
Black Canyon	None	1,000	1,000	3.3	4.4	-	.053	.043	-	-19	-	53	43	10	100	19	14	16	.28	.31	.045	.050	+ 11	33	44
Clay Cr.	2,440*	2,320*	2,320	5.1	9.3	.061	.054	.167	-11	+210	149	122	387	0	55	32	44	40	.17	.38	.068	.152	+ 123	118	216
Lower Cougar	2,560*	3,180*	3,600*	5.7	4.6	.059	.121	.150	+105	+ 24	150	385	540	52	60	13	13	13	.93	1.15	.121	.150	+ 24	181	166
Upper Cougar	4,480	4,040*	3,700	3.6	4.4	.038	.053	.141	+ 39	+166	170	214	522	37	83	18	17	17	.29	.83	.049	.141	+ 188	146	163
Bumblebee	1,900*	3,040*	3,040*	6.5	5.4	.063	.166	.030	+163	-82	119	504	91	35	20	9	8	9	1.84	.37	.166	.033	-80	199	165
Total	23,380	27,460	27,620	5.7	5.9	.073	.083	.109	-36	+132	1706	2288	3008	26	57	19	18	18	.44	.60	.079	.108	+ 37	1553	1627

FORKS DISTRICT

Unit	Acres Surveyed 1930	Acres Surveyed 1931	Acres Surveyed 1932	Per cent of unit covered 1931	Per cent of unit covered 1932	New attacks per acre 1930	New attacks per acre 1931	New attacks per acre 1932	Per cent of change in status 1931	Per cent of change in status 1932	New attacks on unit 1930	New attacks on unit 1931	New attacks on unit 1932	Per cent of new attacks were windfalls 1931	Per cent of new attacks were windfalls 1932	Stand white pine trees per acre 1931	Stand white pine trees per acre 1932	Average over two years 1931-1932	Per cent of stand infested 1931	Per cent of stand infested 1932	New attacks per acre taken from % of stand inf. & applied to average stand. 1931	New attacks per acre taken from % of stand inf. & applied to average stand. 1932	Per cent of increase or decrease	Acres of sample strip 1931	Acres of sample strip 1932
Big Elk	5,200*	4,960	4,960	2.	2.7	.038	.000	.081	-100	+100	197	-	402	-	72	17	12	14	-	.61	-	.085	+ 100	99	135
Potter Cr.	3,760*	3,800	3,800	4.	4.5	.096	.091	.082	-5	-10	360	351	312	100	7	26	29	28	.35	.28	.098	.078	-20	118	170
Stewart Cr.	2,000*	2,200	2,200	3.	1.6	.181	.125	.111	-31	-11	362	275	244	50	100	16	16	16	.78	.69	.125	.111	-11	64	36
Flat Cr.	3,680*	3,680	3,680	4.	3.9	.041	.044	.041	+ 7	-7	150	162	150	66	33	16	13	14.5	.28	.32	.041	.046	+ 12	140	145
Total	14,640	14,640	14,640	2.9	3.3	.073	.054	.076	-26	+41	1069	788	1108	75	72	19	19	19	.28	.40	.054	.076	+ 41	421	486
Grand total	107,830	127,550	127,430	4.3	4.8	.086	.098	.118	+ 14	+ 20	9327	12,505	15,007	56	50	18.6	19.3	19	.53	.61	.100	.116	+ 16	5484	6185

SHOSHONE DISTRICT

Unit	Acres Surveyed 1930	Acres Surveyed 1931	Acres Surveyed 1932	Per cent of unit covered 1931	Per cent of unit covered 1932	New attacks per acre 1930	New attacks per acre 1931	New attacks per acre 1932	Per cent of change in status 1931	Per cent of change in status 1932	New attacks on unit 1930	New attacks on unit 1931	New attacks on unit 1932	Per cent of new attacks are windfalls 1931	Per cent of new attacks are windfalls 1932	Stand white pine trees per acre 1931	Stand white pine trees per acre 1932	Average for 1931-1932	Per cent of stand infested 1931	Per cent of stand infested 1932	New attacks per acre taken from % of stand inf. & applied to average stand. 1931	New attacks per acre taken from % of stand inf. & applied to average stand. 1932	Per cent of increase or decrease	Acres of sample strip 1931	Acres of sample strip 1932
Sissons	4,000*	4,700*	4,700*	6.8	8.4	.275	.182	.122	-34	-33	1100	855	574	8	15	24	26	25	.75	.47	.187	.117	-37	319	396
Kiehler Cr.	None	900*	900	4.4	3.6	-	.300	.125	-	-58	-	cull logs 270	112	100	25	19	17	18	1.57	.74	.283	.133	-53	40	32
Yellow Dog No. S.	incl. in Y.D.R.	840*	840*	8.	13.6	-	.229	.360	-	+57	-	192	303	87	61	24	40	34.5	.95	.90	.328	.310	+ 5	66	114
Yellow Dog River	2,280*	1,880*	2,140*	6.5	7.	.161	.467	.584	+190	+ 25	367	878	1249	60	8	33	47	40	1.41	1.24	.564	.496	-12	122	149
Yellow Dog Creek	2,880*	4,120*	4,120*	4.6	7.	.138	.069	.133	-50	+93	397	284	448	43	40	41	52	48	.17	.26	.081	.125	+ 54	188	286
Downey Creek	2,560*	4,160*	4,160*	5.2	5.8	.244	.167	.154	-31	-7	524	694	640	3	30	42	43	43	.40	.36	.172	.155	-10	220	240
Flat Creek	3,200*	2,840*	4,120*	2.	4.	.126	.080	.221	-36	+176	403	227	910	83	41	19	23	22	.42	.96	.092	.211	+ 129	56	167
Bennett	Brett Miner	580*	580*	6.2	10.7	-	.028	.161	-	+475	-	16	93	100	90	13	33	26	.21	.49	.055	.127	+ 122	36	62
Brett-Miner	1,980*	1,550*	1,550*	6.3	5.9	.026	.133	.109	+411	-18	51	206	880 CL: 169	90	50	12	19	15	1.11	.57	.166	.085	-49	98	92
Rock City	2,260*	1,600	1,600	4.	4.	.104	.016	.031	-85	+ 90	235	22	220 CL: 49	100	100	12	25	19	.13	.12	.025	.023	-8	62	64
Big Cr. (Hawk)	4,040	8,000*	8,780*	3.	3.9	.098	.139	.035	+ 42	-75	396	1112	307	65	41	12	14	13	1.16	.25	.151	.032	-79	241	345
Big Cr. (Cabin)	6,500	7,000*	7,000	2.3	3.4	.088	.067	.021	-24	-69	572	462	147	31	40	13	14	14	.52	.15	.073	.021	-71	163	240
Falls Creek	None	6,000	2,600	1.7	1.9	-	.035	.040	-	+ 14	-	210	104	56	50	7	13	9	.50	.30	.045	.027	-40	105	51
Eagle Cr. W. Fk.	1,640	1,640	1,280	0	2.6	.091	.121	.061	+ 33	-49	150	198	78	-	50	-	17	17	-	.36	-	.061	-	None	33
Eagle Cr. E. Fk.	3,520	3,000	3,540*	4.	6.0	.057	.200	.066	+251	-67	200	600	234	45	30	12	13	13	1.66	.51	.216	.066	-69	156	213
Totals	34,860	48,810	47,910	3.8	5.2	.126	.125	.125	0	0	4395	6091 [1]	5967	63	40	22	26	24	.57	.48	.137	.115	-16	1872	2484

*

[1] Two cull logs were considered equal to one tree or windfall for comparison.

LITTLE RIVER DISTRICT

Unit	Acres Surveyed 1930	Acres Surveyed 1931	Acres Surveyed 1932	Per cent of unit covered 1931	Per cent of unit covered 1932	New attacks per acre 1930	New attacks per acre 1931	New attacks per acre 1932	Per cent of change in status 1931	Per cent of change in status 1932	New attacks on unit 1930	New attacks on unit 1931	New attacks on unit 1932	Per cent of new attacks are windfalls 1931	Per cent of new attacks are windfalls 1932	Stand white pine trees per acre 1931	Stand white pine trees per acre 1932	Average over two years 1931-1932	Per cent of stand infested 1931	Per cent of stand infested 1932	New attacks per acre taken from % of stand inf. & applied to average stand. 1931	New attacks per acre taken from % of stand inf. & applied to average stand. 1932	Per cent of increase or decrease	Acres of sample strip 1931	Acres of sample strip 1932
Forks	1,240*	2,040	1,100*	2.0	6.5	.110	.206	.154	+87	-25	126	420	169	14	73	29	21	24	.71	.73	.170	.175	+ 3	41	72
Tom Lavin	3,150*	3,320	3,000*	5.0	5.6	.090	.090	.101	0	+12	284	298	303	54	53	17	17	17	.53	.59	.090	.100	+ 11	166	167
Iron Creek	3,840*	4,120	4,120	3.0	3.6	.050	.019	.102	-62	+427	192	78	420	50	86	10	14	12	.19	.73	.023	.088	+ 283	124	147
Cathcart	3,440*	3,200	3,200	4.0	4.3	.063	.045	.237	-29	+427	215	144	872 CL 758	67	33	15	11	13	.30	2.15	.039	.279	+ 615	128	139
Cascade	4,560*	4,640	4,640	5.0	4.9	.078	.083	.092	+ 6	+11	355	385	427	35	43	17	14	16	.49	.66	.078	.106	+ 36	232	229
Picnic	1,360	1,680	1,680	4.0	4.5	.120	.064	.091	-47	+42	163	107	153	50	29	8	9	9	.80	.90	.072	.081	+ 12	67	75
Honeysuckle	4,160*	4,320	5,320	7.0	4.2	.046	.057	.160	+ 24	+181	191	246	851	36	31	12	9	11	.47	1.78	.052	.196	+ 296	302	224
Delaney-Linberg	3,200	3,200	3,200	3.0	2.7	.030	.012	.070	-60	+483	96	38	224	50	17	10	6	8	.12	1.17	.048	.094	+ 96	96	85
Lieberg	3,820*	3,920	4,440*	4.7	4.0	.054	.207	.101	+283	-51	206	811	448	92	83	9	9	9	2.30	1.12	.207	.101	-51	183	177
Laverne	2,300*	2,200	2,560	2.7	5.1	.052	.085	.123	+ 63	+ 45	120	187	315	40	44	18	15	16	.47	.82	.075	.131	+ 75	59	130
Copper Creek	3,880	4,000	4,000	6.0	3.6	.054	.156	.105	+189	-32	209	624	420	72	53	14	14	14	1.11	.75	.155	.105	-32	240	143
Total	34,950	36,640	37,260	4.5	4.3	.062	.091	.132	+45	+45	2157	3338	4924	57	53	14	12	13	.65	1.10	.084	.143	+ 70	1638	1588